

On Some Rules in the Behavior of the Rare Earths and Yttrium SOV/7-59-4-1/9
in Magmatic and Postmagmatic Processes

rock groups is shown in table 1. Totally 61 samples were investigated. The major part was supplied by the Tuvinskiy otryad (Tuva Department) of the Institut geokhimii i analiticheskoy khimii im. V. I. Vernadskogo AN SSSR (Institute of Geochemistry and Analytical Chemistry im. V. I. Vernadskiy AS USSR), furthermore by Yu. V. Makhin, N. Ye. Kostin, V. I. Kudrin, and I. A. Nechayeva. The analysis method was already earlier published (Ref 1). The analysis results are given as quotients $\frac{M}{Nd}$ (M=TR or Y), i. e. in table 2 for

the cerium minerals (33 samples), in table 3 for the minerals with cerium earths and yttrium oxides (14 samples), and in table 4 for the minerals with yttrium oxides (14 samples). A linear connection between the quotients of light lanthanides (La - Sm) (Fig 1) exists in cerium minerals. A maximum occurs in the case of Dy (Fig 5) in heavy lanthanides (Gd - Lu); this is a regional peculiarity. The fluctuations in the lanthanide content depend mainly on the age of the rocks, their alkalinity, and the genetic type of the mineral formation. The crystalchemical properties of the minerals determine the interval in the lanthanide series which is assumed in the lattice. The yttrium oxides are enriched towards the end of the

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magmatic process; the nepheline syenites are enriched with cerium earths independently of their age. - Finally the geochemical behavior of Zr - Hf, Nb - Ta, and TR - Y is compared. The analyses necessary for this purpose were carried out by I. D. Shevalevskiy in the spektral'naya laboratoriya (Spectral Laboratory) of the institute mentioned in the Association (Table 5). The conditions are, however, very complicated in the case of the rare earths since the cerium earths are more mobile than the yttrium oxides, and yttrium itself is still more mobile than the last mentioned ones. There are 5 figures, 5 tables, and 10 Soviet references.

ASSOCIATION:

Institut geokhimii i analiticheskoy khimii AN SSSR im. Vernadskogo, Moskva
(Institute of Geochemistry and Analytical Chemistry, AS USSR, imeni
Vernadskiy, Moscow)

SUBMITTED:

October 23, 1958

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5(4)

AUTHORS:

Vaynshteyn, E. Ye.,
Antipova-Karatayeva, I. I.

SOV/78-4-4-13/44

TITLE:

Investigation of the Solvation of the Cu^{2+} Ion in Aqueous Solutions Using Optical Absorption Spectra (Issledovaniye solivatsii iona Cu^{2+} v vednykh rastvorakh s pomoshch'yu opticheskikh spektrov pogloshcheniya)

PERIODICAL:

Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 4, pp 783-792 (USSR)

ABSTRACT:

The form and the fine structure of the absorption bands of the Cu^{2+} ions in the spectra of aqueous solutions of copper chloride and copper nitrate were investigated in the region 220-1,200 mμ. The spectra were plotted using a SF-4 spectro-photometer for concentrations of the copper salts from 0.008 to 9 N. A broad absorption band appears in the spectra with an absorption maximum at 800 mμ. With an increase in concentration the maximum is displaced toward longer wavelengths. The parameters ascertained for the absorption bands in the spectra of the solutions with the above-mentioned concentrations are summarized in table 1.

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A new method of analysis and evaluation of the experimental results is suggested which allows the separation of the compound absorption lines into their components. This method makes possible the calculation of the parameters and the ascertainment of the structure of the asymmetrical absorption bands of the copper ion. The dependence of the position of the maxima of the summary absorption curves upon the distance between the maxima of the components at various values

$\frac{D_2}{D_1}$ is given in figures 2-4. $\frac{D_2}{D_1}$ absorption ratio of the

maxima of both components. On the basis of the parameters determined the absorption curves of the components and the summary curves were plotted and compared with the experimentally determined absorption spectra. The nomogram used for establishing the absorption curves is given in figure 8. The proposed method for resolving the asymmetrical curves into the symmetrical components makes possible an analysis of $\pm 10\%$ accuracy. An important characteristic of the symmetry of the field, which is formed by the radicals around the

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Cu^{2+} ion in solution, is the ratio of the frequencies $\frac{\nu_1}{\nu_2}$
of the corresponding maxima of the single components of the
observed absorption bands. In dilute solutions $\frac{\nu_1}{\nu_2}$ for the

spectra of both the above-mentioned salts is practically the
same (1.25 for copper chloride solutions and 1.24 for copper
nitrate solutions). The dependence of the configuration of
the solvated molecules upon the concentration of the solution
and upon the nature of the anions was investigated. On the
basis of the calculations and the experimental data for the
ratio of the frequencies of the maxima of both components of

of the compound absorption bands $\frac{\nu_1}{\nu_2} = 1.24 - 1.29$ it was

shown that the field formed by the radicals surrounding the
copper ion possesses the symmetry of a tetragonal bipyramid.
A table gives the parameters of both components of the ab-
sorption bands for both the salts investigated.

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Investigation of the Solvation of the Cu^{2+} Ion in
Aqueous Solutions Using Optical Absorption Spectra

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There are 13 figures, 2 tables, and 9 references, 5 of which
are Soviet.

ASSOCIATION: Institut geokhimii i analiticheskoy khimii im. V. I. Vernadskogo Akademii nauk SSSR (Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy of the Academy of Sciences, USSR)

SUBMITTED: January 21, 1958

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5(4)

AUTHORS:

Antipova-Karatayeva, I. I.,
Vaynshteyn, E. Ye.

SOV/78-4-4-14/44

TITLE:

Investigation of the Solvation of the Cu^{2+} Ion in Alcoholic
Solutions Using Optical Absorption Spectra (Issledovaniye
sol'vatatsii iona Cu^{2+} v spirtovykh rastvorakh s pomoshch'yu
opticheskikh spektrov pogloshcheniya)

PERIODICAL:

Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 4, pp 793-800
(USSR)

ABSTRACT:

The absorption spectra of solutions of $\text{Cu}(\text{NO}_3)_2 \cdot 3\text{H}_2\text{O}$ and
 $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$ in anhydrous methyl and ethyl alcohols were in-
vestigated. The spectra were plotted using a SF-4 spectro-
photometer at wavelengths of 220-1,200 mμ. The $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$
concentration varied between 0.001 and 3 N in ethyl alcohol and
0.001 and 8.2 N in methyl alcohol. The concentration of
 $\text{Cu}(\text{NO}_3)_2 \cdot 3\text{H}_2\text{O}$ varied from 0.0005 to 3.2 N in ethyl alcohol.
The spectra show a broad absorption band with a maximum at
870 mμ. The variation of the absorption bands with the nature

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Investigation of the Solvation of the Cu^{2+} Ion in SOV/78-4-4-14/44
Alcoholic Solutions Using Optical Absorption Spectra

of the solvent and the number of solvent molecules on the solvated copper ion was investigated, and the results are summarized in tables 1-3. The solvated molecules formed in aqueous and alcoholic solutions have similar structures. In the solutions of $\text{Cu}(\text{NO}_3)_2 \cdot 3\text{H}_2\text{O}$ the symmetry of the field of the solvated molecules is invariable over the concentration range investigated. Nevertheless, in solutions of $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$ in water and methyl alcohol the symmetry of the field of the solvated molecule is variable over the concentration range.

The cause of this is the complicated solvated molecules which form in concentrated solutions of copper chloride and which include chloride ions. Beer's Law is followed in the range of lower concentrations in aqueous and alcoholic solutions. The absorption coefficients of Cu^{2+} are somewhat greater in ethyl alcohol than in methanol solutions. There are 5 figures, 3 tables, and 8 references, 2 of which are Soviet.

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5(2), 5(4)
AUTHORS:

Belyayev, Yu. I.; Vaynshteyn, E. Ye.

SOV/74-14-1-27/32

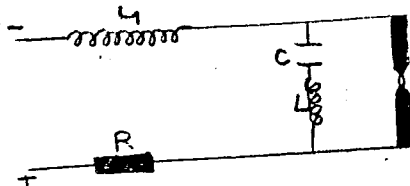
TITLE:

On the Use of a "Sound Arc" for Increasing the Reproducibility of Quantitative Determinations by Spectral Analysis (Ob ispol'zovanii "zvuchashchey" dugi dlya povysheniya vosproizvodimosti kolichestvennykh opredeleniy spektral'nym metodom)

PERIODICAL:

Zhurnal analiticheskoy khimii, 1959, Vol 14, Nr 1, pp 133-134 (USSR)

ABSTRACT:



Basic scheme of a Sound Arc

In order to increase the reproducibility and exactitude of quantitative determination by spectral analysis a direct-current pulse arc (Ref 1) is used. Another possibility is offered by the use of the so-called sound arc, which is used also in radio engineering (Ref 2). The principle upon which

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the effect produced by this arc is based is the following:
The plasma of the arc is known to have no constant resistance,
and therefore the direction of the current at the electrodes
varies continuously. If an oscillation field is applied to
the arc (see figure), the natural oscillations of which amount
to a period of $T = 2\pi \sqrt{LC}$, the oscillations of the plasma
are amplified with this period and, in turn, cause an amplifica-
tion of the intensity of field oscillations. In this connec-
tion a certain stabilization of the arc discharge may be
expected to occur on the frequency $\omega = 1/T$ which entails an
increase of the stability of operative conditions of the energy
source. Outwardly, this manifests itself by the fact that the
arc begins to emit sounds as soon as ω is between 50 and
20000 cycles. This possibility of increasing the stability
of operative conditions by building-in the direct current arc
into the scheme of a sound arc was experimentally tested and
found to be efficient. A comparison of the errors (occurring
with and without use of the sound arc respectively) is shown
by figures. There are 2 figures and 3 references, 1 of which

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On the Use of a "Sound Arc" for Increasing the
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is Soviet.

ASSOCIATION: Institut geokhimii i analiticheskoy khimii im. V. I.
Vernadskogo AN SSSR, Moskva (Institute of Geochemistry and
Analytical Chemistry imeni V. I. Vernadskiy of the AS USSR,
Moscow)

SUBMITTED: June 6, 1958

Card 3/3

5(4), 5(2)
AUTHORS:

SOV/75-14-2-1/27
Belyayev, Yu. I., Vaynshteyn, E. Ye., Korolev, V. V.

TITLE:

Comparative Investigation of the Spatial Distribution of Elements in a Direct Current— and a Pulsed Current Arc by Means of Radioactive Isotopes (Sravnitel'noye issledovaniye prostranstvennogo raspredeleniya elementov v duge postoyannogo toka i impul'snoy duge pri pomochi radioaktivnykh izotopov)

PERIODICAL:

Zhurnal analiticheskoy khimii, 1959, Vol 14, Nr 2, pp 147-151 (USSR)

ABSTRACT:

The authors carried out their examinations by means of a method that has been described before (Refs 3-5). It was demonstrated that independently of the character of distribution of the elements within the plasma of a d.c. arc, uniform distribution with distinctly marked maximum occurs for all elements with the exception of the alkali metals in an impulse arc. This maximum is located within the center of the space between the electrodes. The exceptional position of the alkali metals is explainable by their lower ionization potentials. With these elements equal distribution in the space between the electrodes may be obtained by dilution of

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the specimen with a buffer mixture. (carbon powder and copper oxide). The spatial distribution of copper at its evaporation as a metal in a spark discharge has been examined in a d.c. arc and an impulse arc to discover the mechanism of the entry of the atoms into the space between the electrodes. The γ -radiation of ^{64}Cu , which has been evaluated photographically, was used for the investigation. The following was found in this connection: Unlike to what is the case in the spark discharge and the d.c. arc in the plasma of which the distribution of the substance separated from the anode is rather unequal, the distribution is equal within the center of the space between the electrodes of an impulse arc. Moreover, within the plasma of an impulse arc a characteristic "protuberance" appears, marked by higher density and which is in immediate connection with the substance contained within the crater of the anode. By this phenomenon it may be concluded that, besides by normal interspaced distillation, the entry of the elements into the space between the electrodes can also result by periodical "injections" of the melted substance to be analyzed. The kinetics of evaporation

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and the spatial distribution of the elements has been examined by means of various silver combinations, sodium chloride and copper chloride. The resulting curves depend upon the sort of the respective combinations. This points to the fact that the state of the atoms of the examined elements is not equivalent within the plasma if the elements are evaporated in the form of various combinations. The curves of distribution obtained are given by several illustrations. For his aid in conducting these examinations the authors express their gratitude to N. P. Yakovlev. There are 8 figures and 7 references, 6 of which are Soviet.

ASSOCIATION: Institut geokhimii i analiticheskoy khimii im. V. I. Vernadskogo AN SSSR, Moskva
(Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy of the AS USSR, Moscow)

SUBMITTED: May 22, 1958
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5(2)

AUTHORS:

SOV/75-14-4-2/30

Shevalevskiy, I. D., Nalimov, V. V., Vaynshteyn, E. Ye.

TITLE:

PERIODICAL:

ABSTRACT:

Investigation of the Errors in X-ray Spectroscopic Analysis
Zhurnal analiticheskoy khimii, 1959, Vol 14, Nr 4, pp396-403 (USSR)
The errors of X-ray spectroscopic analysis were investigated
by quantitative X-ray spectrographic determination of zirconium and hafnium in minerals and ores. The authors ascertained the relations between the parameters of the calibration curve on the side, and changes of the working conditions during the analysis and the development of the spectrogram on the other side. Contrary to optical spectroscopic analysis where generally both parameters of the calibration curve change in the course of time, only a reciprocal parallel displacement of the calibration curve occurs in X-ray spectroscopic analysis. This fact permits the determinations on the basis of a single constant calibration curve, the position of which is controlled with the help of a standard with not too small a content of the respective element. The straying of the results can be split up into three components: σ_R - error due to lack of reproducibility, characterized by the straying of the results in relation to an arithmetic mean which was calculated.

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culated for a short period; σ_{Ei} - error caused by the instability of the process of rubbing the sample into the anode; σ_{T} - error caused by other uncontrollable factors which change in the course of time. The most important of these factors is the lack of constancy during the development of the film. At known values of σ_R , σ_{Ei} and σ_{T} , the constant calibration curve must be displaced parallelly only if the point which corresponds to the control standard sample, is further away than

$\pm 2 \sqrt{\frac{\sigma_R^2}{nm} + \frac{\sigma_{Ei}^2}{m}}$ (m - number of parallel rubbings, n - number of parallel determinations of each rubbing). If this parallel displacement of the curve surmounts the limits

Card 2/4 $\pm 2 \sqrt{\frac{\sigma_R^2}{nm} + \frac{\sigma_{Ei}^2}{m} + \sigma_t^2}$, the results are uncertain and the

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determination must be repeated. When using an anode with four slits for increasing the exactitude of the determinations, it is suitable to choose $m = 2$, $n = 2$ for the sample to be analyzed as well as for the standard. When using a constant calibration curve for rapid determinations, without the use of a control standard, an increase in the number of exposures for each rubbing is of little consequence on the results, since the error in the determination depends mainly on $\sigma_{E1}^2 + \sigma_T^2$, which quantity is not reduced thereby. The accuracy of the determination, when using a constant calibration curve, cannot be increased even by a periodical check of the calibration curve. The error analysis is fully discussed in the paper. There are the following tables: 1) and 2): Results of the examination of the hypothesis of a normal error distribution for errors in the reproducibility, and for the straying between the results of X-ray spectroscopic analysis and chemical analysis; 3) and 5): Compilation of the calculation data for the investigation of the straying which is caused by the influence of one factor (Table 3) and by the influence of two factors

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(Table 5); 4): Root square deviations and the straying coefficients in the determination of hafnium; 6) Results of the analysis of error straying, which was carried out by the determination of zirconium; 7) Relation between the quantity of the errors in the determination of ΔS on the one side, and the number of rubbings (m) and the number of parallel determinations (n), on the other side. There are 9 figures, 7 tables, and 12 references, 7 of which are Soviet.

ASSOCIATION: Institut geokhimii i analiticheskoy khimii im. V. I. Vernadskogo AN SSSR, Moskva (Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, AS USSR, Moscow)

SUBMITTED: June 12, 1958

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24(7)

AUTHORS:

Barinskiy, R. L., Vaynshteyn, E. Ye.

SOV/48-23-5-11/31

TITLE:

The Collective Interaction of Electrons in Crystals and Its Effect on the Structure of the X-ray Absorption Spectrum of Atoms in Polar Crystals (Kollektivnoye vzaimodeystviye elektronov v kristallakh i yego proyavleniye v strukture rentgenovskikh spektrov pogloshcheniya atomov v polyarnykh kristallakh)

PERIODICAL:

Izvestiya Akademii nauk SSSR, Seriya fizicheskaya, 1959, Vol 23, Nr 5, pp 585-590 (USSR)

ABSTRACT:

Earlier papers by the authors and others (Refs 1, 2, 3) dealt with the investigation of two line series of absorption, which may be described by the formula applicable to hydrogen-like spectra. To explain these spectra it is necessary to know the excited state of the electron system. A first introduction was given by Ya. I. Frenkel. By the aid of the many-electron theory a description is given of the interaction in solid substances. It is stated that the interacting electrons obey the Bose-statistics. Ye. F. Gross and his collaborators dealt in a series of papers with the collective interaction of electrons in the lattice of solid substances from the quasicorpuscular point of

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The Collective Interaction of Electrons in Crystals
and Its Effect on the Structure of the X-ray Absorption Spectrum of Atoms in
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view. They investigated the optical absorption spectrum of a number of crystals within the range of low temperatures. The formula (1) developed by N. Mott for the computation of the radius of the optical exciton is then given. Next, considerations are made regarding the series boundary of exciton lines, and formula (2) is written down in this connection. Cauchois and Mott first discovered the existence of exciton line series in the X-ray spectrum. Papers by these and some other authors, dealing with KCl crystals along these lines, are discussed. Considerations are made of the dielectric constant and formulas (3) and (4) are given. Formulas thus obtained allow a computation of the energy spectrum of the X-ray exciton in the KCl crystals. Numerically and experimentally obtained results of X-ray and optical excitons are shown in a diagram, and the energy states are investigated. Finally, the absorption spectrum in the ultraviolet range of RbBr and CsBr is investigated. There are 2 figures and 23 references, 13 of which are Soviet.

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24,6820(1153,1160)
9,4300(1043,1155)

23351 S/058/61/000/006/038/063
A001/A101

AUTHORS: Vaynshteyn, E.Ye., Brill', M.N., Kopelev, Yu.F.

TITLE: The use of fine structure of X-ray absorption spectra for determining the internal field in ferroelectrics

PERIODICAL: Referativnyy zhurnal. Fizika, no. 6, 1961, 254, abstract 6E157 ("Nauchn. zap. kafedr matem., fiz. i yestestvozn. Odessk. gos. ped. in-t", 1959, v. 24, no. 1, 29 - 33)

TEXT: The fine structure of Ti X-ray absorption spectrum in ferroelectric BaTiO_3 is associated with the high value of internal field and is considered as an analog of Stark splitting. The structure of the electron shell of the Ti^{4+} ion warrants its consideration as hydrogen-like and establishing a correlation between the internal field intensity and the magnitude of splitting of 4p and 5p levels. Experimental values of separations between the components of the split lines permitted the estimate of internal field affecting Ti^{4+} : $E_{\text{int}}(\text{Ti}) = (6 - 8) \times 10^5$ CGSE. The part of spontaneous polarization caused by displacements of Ti ions was estimated. The magnitude obtained is in satisfactory agreement with estimates made on the basis of electric measurements. This indicates the possibility of

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using the X-ray spectral method for independent investigations of phenomena of spontaneous polarization in crystals. The possibility of using, in principle, the fine structure of X-ray absorption spectra in ferroelectrics for determining the direction of ion displacements under conditions of spontaneous polarization, is pointed out.

V. Lyubimov

[Abstracter's note: Complete translation]

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23331 S/058/61/000/006/016/063
AC01/A101

9,4300 (1147, 1155, 1151)

AUTHORS: Vaynshteyn, E.Ye., Kotlyar, B.I., Shapira, G.A.

TITLE: The fine structure of iron X-ray absorption spectra in some ferrites

PERIODICAL: Referativnyy zhurnal. Fizika, no. 6, 1961, 150, abstract 6V111
("Nauchn. zap. kafedr matem. fiz. i yestestvozn. Odessk. gos. ped. in-t", 1959, v. 24, no. 1, 34 - 39)

TEXT: The K-spectra of Fe absorption in antiferromagnetic oxide α -Fe₂O₃ and ferrites of Ni, Co, Mn, Cr and Zn were investigated on a X-ray focusing (according to Johann) spectrograph with a quartz crystal (1340). It was found out that the position of the first absorption maximum in all substances investigated did not practically depend on the magnetic state of the substance and was not sensitive to replacement of one bivalent metal by the other. In the antiferromagnetic α -Fe₂O₃ occurs decrease of absorption in the initial region of the K-edge (in comparison with para- and ferromagnetic modification), which is due to ordering of electron spins and overlapping of the vacant part of 3d-shell with 4s and 4p-states. The shortwave fine structure of absorption K-edges in ferrites can be

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interpreted as a result of cross transitions of ls-electrons of the absorbing atoms to the vacant places in p-shells of O^- ions; the excited state of the latter is caused by the existence of an indirect bond between magneto-active atoms according to Kramer's hypothesis.

I. Nikiforov

[Abstracter's note: Complete translation]

Card 2/2

VAYNSHTEYN, E.Ye.; KOTLYAR, B.I.; SHAPIRO, G.A.

Investigation of the fine structure of the X-ray absorption spectra of iron in some antiferromagnetics and ferrites.
Dokl.AN SSSR 125 no.1:55-58 Mr-Apr '59. (MIRA 12:4)

1. Institut geokhimii i analiticheskoy khimii imeni V.I.Vernadskogo AN SSSR. i Odesskiy pedagogicheskiy institut imeni K.D. Ushinskogo. Predstavleno akademikom A.P.Vinogradovym.
(Iron--Spectra) (Magnetic materials)

24(7)

AUTHORS:

SOV/20-126-4-15/62
Vaynshteyn, E. Ye., Brill', M. N., Kopelev, Yu. F.

TITLE:

The Fine Structure of the X-ray-K-spectrum of the Absorption of Titanium in the Titanate System BaO-TiO_2 and Its Relation to the Properties of the Polarization of Atoms in Seignette-electric Crystals (Tonkaya struktura rentgenovskikh K-spektrov pogloshcheniya titana v titanatakh sistemy BaO-TiO_2 i yeye svyaz' s kharakterom polyarizatsii atomov v segnetoelektricheskikh kristallakh)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 4, pp 744 - 747 (USSR)

ABSTRACT:

In the present paper investigations of the fine structure of the X-ray absorption spectrum of some compounds of the system BaO-TiO_2 are carried out for the purpose of evaluating the symmetry and the magnitude of the internal field in crystals. Investigations are carried out of BaO.TiO_2 , BaO.2TiO_2 and BaO.4TiO_2 , and the results obtained are given by three diagrams (Figs 1,2,3). An investigation of these results and a

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comparison with those of one of the authors' earlier papers is carried out in five sections: 1) The X-ray absorption spectra of all three compounds have characteristic properties, which are suited for the purpose of acquiring further knowledge with respect to these compounds. 2) In accordance with the results obtained by a paper by N. I. Shchepochkina it is stated that barium tetranitrate ($\text{BaO} \cdot 3\text{TiO}_2$) is not a separate compound. 3)

A connection between the fine structure of the X-ray absorption spectrum of atoms and the polarization conditions in dielectric media was found to exist. 4) The splitting of absorption lines is investigated, and for the distance between the components of the split-off doublet the two formulas (1) and (2) are given, and for the extent of splitting for absorption lines of titanium, in connection with the transition of the 1s-electron to the 4p- and 5p-level, 4.8 and 5 ev are given respectively. From these data the internal field acting upon a titanium ion is estimated at $(6-8) \cdot 10^5$ esE. 5) In the case of a spontaneous polarization of the titanium ion, the latter is displaced in

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Absorption of Titanium in the Titanate System BaO-TiO_2 and Its Relation to
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the crystal, which results in a deterioration of symmetry.
The latter is accompanied by a splitting of degenerated levels,
which may be determined by means of the group theory. In con-
clusion, the further application of the group theory is out-
lined, and the splitting of the levels into multiplets by
transitions of the 1s electron is briefly explained. There are
3 figures and 11 references, 8 of which are Soviet.

ASSOCIATION: Institut geokhimii i analiticheskoy khimii im. V. I. Vernadskogo Akademii nauk SSSR (Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy of the Academy of Sciences, USSR), Odesskiy pedagogicheskiy institut im. K. D. Ushinskogo (Odessa Pedagogical Institute imeni K. D. Ushinskiy)

PRESENTED: February 27, 1959, by A. P. Vinogradov, Academician

SUBMITTED: February 24, 1959

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SOV/20-127-3-15/71

5(4)

AUTHORS: Zhurakovskiy, Ye. A., Vaynshtayn, E. Ye.

TITLE: X-Ray K-Absorption Spectra of Vanadium in Some Hydrides, Carbides, Nitrides, and Borides

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 3, pp 534-536 (USSR)

ABSTRACT: In earlier papers (Refs 1-3) it was possible, from the analysis of X-ray K-absorption spectra, to obtain important information concerning the physical nature of the chemical interaction forces between the atoms of the above compounds with titanium, and it was also for the first time possible to obtain confirmation of the hypothesis concerning the metalization of the hydride bond, which is expressed by the filling in stages of the 3d-level of the transition elements with hydrogen electrons. The rule observed was investigated in the present paper on vanadium in the afore-mentioned compounds. The apparatus and the experimental conditions were the same as described in references 1-4. Analyses were carried out of the fine structure of the absorption of the K-boundary of the following vanadium compounds: Metallic vanadium, VaO_5 , 2

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SOV/20-127-3-15/71

X-Ray K-Absorption Spectra of Vanadium in Some Hydrides, Carbides, Nitrides, and Borides

carbides with a content of 16 and 19% C respectively, the nitrides, borides, and diborides and the hydrides with a variation of the H-content of 0.16 - 1.25 wt%. The compounds had been tempered for 30 - 240 minutes at corresponding temperatures. The preparations were produced and analyzed at the Institut metallokeramiki i spetssplovov AN USSR (Institute of Metal Ceramics and Special Alloys of the AS, UkrSSR) by G. V. Samsonov and T. V. Dubovnik. The following results were obtained by the investigations: The fine structures of the K-absorption edge of vanadium in pentoxide, carbide, and nitride are very similar to one another. In all compounds the white line in the long-wave range remained conserved. In transition from oxides to nitrides, a decrease of the intensity was found to occur, which, according to reference 6, corresponds to the loosening of the covalent bond in the compounds. The vanadium spectrum in carbides in the case of different C-contents is independent of the metalloid content. The oxides and hydrides, on the other hand, differ considerably with respect to their spectra. If the H-content of the hydride is low, it differs only little from that of pure metal;

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with an increasing H-content, the maxima in the long-wave range vanish (prove for the filling up of electrons in the 3d-level of vanadium). The spectra of borides occupy an intermediate position between the carbides, nitrides, and hydrides. They are similar to those of the carbides, nitrides, and hydrides with a low H-content, in which the corresponding lines exist in the long-wave range. The diboride spectrum, on the whole, corresponds to that of hydride with an H-content >1%. The variation of the spectra in transition from carbides to hydrides is similar to the variation observed in the case of titanium (and, according to other investigations, it is also similar to those of Ni, Mo, and Cr). Thus, the general character of the rule observed appears confirmed. There are 1 figure and 8 references, 7 of which are Soviet.

ASSOCIATION: Institut geokhimii i analiticheskoy khimii im. V. I. Vernadskogo Akademii nauk SSSR (Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy of the Academy of Sciences, USSR).

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SOV/20-127-3-15/71

X-Ray K-Absorption Spectra of Vanadium in Some Hydrides, Carbides, Nitrides,
and Borides

Odesskiy pedagogicheskiy institut im. K. D. Ushinskogo
(Odessa Pedagogical Institute imeni K. D. Ushinskiy)

PRESENTED: April 13, 1959, by A. P. Vinogradov, Academician

SUBMITTED: April 8, 1959

Card 4/4

24(7)

AUTHORS:

Vaynshteyn, E. Ye., Zhurakovskiy, Ye. A. SOV/20-128-4-16/65

TITLE:

New Data on X-Ray Emission Spectra of Titanium in Some Hydrides, Carbides, and Nitrides

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 4, pp 695-697 (USSR)

ABSTRACT:

Experimental data of earlier investigations are discussed in detail in the present paper. The authors examined carbide and nitride containing an almost stoichiometric content of non-metal; three hydrides containing 1, 2, and ~3 percents by weight of hydrogen and the original metal of high purity. For comparison they examined the X-ray spectrum of titanium in metallic state under the same conditions. V. I. Mikheyeva put the hydrides at their disposal. All the metals examined were also investigated concerning their X-ray structure. Quartz was used as reflecting crystal. The spectra were photographed in the first order of reflection on a highly sensitive fine-grained film. The experimental results are illustrated in two diagrams and permit among others the following conclusions:
1) The data ascertained by means of the method of fluorescence are in very good accordance with the results of E. Ye. Vaynshteyn

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New Data on X-Ray Emission Spectra of Titanium in
Some Hydrides, Carbides, and Nitrides

SOV/20-128-4-16/65

and Yu. N. Vasil'yev (Ref 1) and they completely confirm them concerning the mutual position of the emission bands of titanium in carbide, nitride, and hydride. In carbide and in nitride the fine structures of the spectra are identical. 2) The structure of the $K\beta_5$ -emission band of titanium in hydrides differs considerably from the structure in carbide and in nitride. The position of the longwave maximum of the $K\beta_5$ -emission band of the titanium remains unchanged in the examined hydrides within the measuring accuracy. The maximum of this part of the band is in a distance of ~ 1 ev (towards the longwave side) from the maximum of the $K\beta_5$ -band of the metallic titanium. The position of the maxima within the doubly-humped $K\beta_5$ -emission band of the titanium in the hydrides does not depend on the hydrogen content. The latter influences only the relative intensity of the shortwave part of the emission band compared to the longwave part. In spite of a high degree of "metallization" of the bonds in the hydrides the 1s-electrons of the hydrogen lose their "individuality"

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New Data on X-Ray Emission Spectra of Titanium in
Some Hydrides, Carbides, and Nitrides

SOV/20-128-4-16/65

only incompletely. In previous investigations by E. Ye. Vaynshteyn and Yu. N. Vasil'yev (Ref 1) no $K\beta$ "-line was observed in the emission spectrum of the examined hydride. But in the present paper a line of weak intensity was observed fairly clear at the longwave side of all the curves belonging to the hydrides. This line can be assumed to be the $K\beta$ "-band of the titanium in this compound. There are 2 figures and 5 Soviet references.

ASSOCIATION: Institut geokhimii i analiticheskoy khimii im. V. I. Vernadskogo Akademii nauk SSSR (Institute of Geochemistry and Analytic Chemistry imeni V. I. Vernadskiy of the Academy of Sciences, USSR). Odesskiy pedagogicheskiy institut im. K. D. Ushinskogo (Odessa Pedagogical Institute imeni K. D. Ushinskiy)

PRESENTED: May 28, 1959, by A. P. Vinogradov, Academician

SUBMITTED: May 25, 1959
Card 3/3

-2.4.6300
5.4130

~~24 (7)~~
AUTHORS:

Zhurakovskiy, Ye. A., Vaynshteyn, E. Ye.

68156

SCV/20-129-6-12/69

TITLE:

A Comparative Investigation of the Fine Structure of X-Ray
Emission Bands of the K β Group of Titanium in a Metal and Its
Compounds With Some Light Elements

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 6, pp 1269 - 1272
(USSR)

ABSTRACT:

First, a survey of publications dealing with this subject is given. The authors extended these investigations by including several titanium beryllides, -borides, and -silicides; the present paper deals with the conclusions drawn from the comparison and analysis of the entire experimental material accumulated in this manner. The titanium compounds mentioned were placed at the authors' disposal by G. V. Samsonov. All X-ray emission spectra were recorded under equal conditions by means of a secondary excitation method on a Tubus spectrograph. Under the experimental conditions chosen in this case, reabsorption exerted no noticeable influence. For each compound, at least three spectrograms were taken and recorded by means of an MF-2 photometer. In all compounds investigated, the position of the

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A Comparative Investigation of the Fine Structure of X-Ray SOV/20-129-6-19/69
Emission Bands of the $K\beta$ Group of Titanium in a Metal and Its
Compounds With Some Light Elements

$K\beta_1$ line always remained unchanged within the experimental error limits. Figures 1-3 and table 1 show the experimental results obtained by the present investigation, which are compared with those obtained for metallic titanium. The width, shape, and position of the $K\beta_5$ band exhibit a sensitive reaction to the assumed bond types in the investigated compounds. The maximum of the $K\beta_5$ band of Ti is, in the case of its dioxide, shifted farthest into the long-wave range. In transition to the metal, the maximum of the $K\beta_5$ emission band of Ti shifts by 0.6 ev towards shorter waves. This shift is the greatest in the case of hydrides (4 ev). The intensity of the short-wave maximum in the hydrides depends on the hydrogen content. A possible physical interpretation has already been discussed. In several of the compounds investigated also the shape and the width of the $K\beta_5$ emission band of Ti changes; it attains its greatest width in the beryllides. A change of the character of the chemical bond in the compounds exerts an especially strong influence upon the

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A Comparative Investigation of the Fine Structure of X-Ray SOV/20-129-6-19/69
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position and the relative intensity of the $K\beta$ " satellite. This conclusion is fully confirmed by the results obtained by the present investigation. The distance $\Delta\nu$ between the $K\beta$ " and the $K\beta_5$ lines in the X-ray K-emission spectrum of titanium in various compounds was bound to depend on the energy difference of the valence levels of the two components of the compound. The experiment confirms such a dependence and leads to the conclusion that in compounds in which electronegativity differs by more than 0.5, there exists a simple relation between the two above-mentioned quantities. There are 4 figures, 1 table, and 19 references, 18 of which are Soviet.

ASSOCIATION: Institut geokhimii i analiticheskoy khimii im. V.I. Vernadskogo
Akademii nauk SSSR (Institute of Geochemistry and Analytical
Chemistry imeni V. I. Vernadskiy of the Academy of Sciences, USSR).
Odesskiy pedagogicheskiy institut im. K. D. Ushinskogo (Odessa
Pedagogical Institute imeni K. D. Ushinskiy)

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68156

A Comparative Investigation of the Fine Structure of X-Ray Emission Bands of the $K\beta$ Group of Titanium in a Metal and Its Compounds With Some Light Elements SOV/20-129-6-19/69

PRESENTED: July 17, 1959, by A. P. Vinogradov, Academician

SUBMITTED: July 14, 1959

Card 4/4

5 (4)

AUTHORS:

Vaynshteyn, E. Ye., Zhurakovskiy, Ye. A. SOV/62-59-8-30/42

TITLE:

The Fine Structure of the X-Ray K-Absorption Spectra of Titanium in Some Hydrides, Borides, and Silicides

PERIODICAL:

Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 8, pp 1493-1495 (USSR)

ABSTRACT:

By means of the X-ray spectrum method new data have been obtained in recent times which explain questions of the inter-atomic forces prevailing in the hydrides, carbides, and nitrides of Ti, V, and Mo. In the present paper the titanium borides and silicides are investigated X-ray-spectrum analytically, in continuation of the work mentioned above. In the crystals, the silicides form embedding phases with structural elements similar to chains or layers. The borides are somewhere in between inter-metallic compounds and the classical embedding phases. The boron atoms may be connected like chains, or they form dimeric layers or trimeric crystal lattice skeletons. This is due to the tendency exhibited by both elements to form clearly covalent compounds. The following borides were investigated: TiB and TiB_2 ; the silicides investigated were Ti_5Si_2 , $TiSi$, $TiSi_2$. The

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The Fine Structure of the X-Ray K-Absorption Spectra
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compounds were prepared at the Institut metallokeramiki i spetsial'nykh splavov AN USSR (Institute of Cermets and Special Alloys of the Academy of Sciences, UkrSSR). Experimental conditions were the same as in references 5-7. The absorption spectra of pure metal, some hydrides, the compounds investigated, and TiO_2 are shown in a figure. The investigations confirmed the hypothesis that the hydrogen in the hydrides is in a state similar to metal. From the results of similar investigations of Va (Ref 7) it is concluded that this hypothesis holds generally. It was seen from the spectra of the borides and silicides that the degree and character of the participation of the $3a'$ -level of titanium in the formation of the metallic bond varies with the different compositions of the compounds. The greater the number of boron or silicon atoms in the compounds, the more marked is the covalent bond between the atoms. The structural elements of the metalloids are more and more weakened. There are 1 figure and 10 references, 9 of which are Soviet.

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The Fine Structure of the X-Ray K-Absorption Spectra
of Titanium in Some Hydrides, Borides, and Silicides

SOV/62-59-8-30/42

ASSOCIATION: Institut geokhimii i analiticheskoy khimii Akademii nauk SSSR
(Institute of Geochemistry and Analytical Chemistry of the
Academy of Sciences, USSR). Odesskiy pedagogicheskiy institut im.
D. N. Ushinskogo (Odessa Pedagogical Institute imeni D. N.
Ushinskiy)

SUBMITTED: February 14, 1959

Card 3/3

RYABCHIKOV, Dmitriy Ivanovich; GOL'BRAYKH, Yevgeniya Kas'yanovna; VINOGRADOV, A.P., akademik, glavnyy red.; ALIMARIN, I.P., red.toma; PALEY, P.N., red.toma; BABKO, A.K., red.; BUSEV, A.I., red.; VAYNSHTEYN, E.Ye., red.; YERMAKOV, A.N., red.; KUZNETSOV, V.I., red.; TANANAYEV, I.V., red.; CHERNIKHOV, Yu.A., red.; TRIFONOV, D.N., red.izd-va; POLENOVA, T.P., tekhn.red.

[Analytical chemistry of thorium] Analiticheskaya khimiya toriya.
Moskva, Izd-vo Akad.nauk SSSR, 1960. 295 p. (MIRA 13:10)
(Thorium--Analysis)

KORENMAN, Izrail' Mironovich; VINOGRADOV, A.P., akademik, glavnyy red.;
BUSEV, A.I., prof., red.toma; ALIMARIN, I.P., red.; BABKO, A.K.,
red.; VAYNSHTEYN, E.Ya., red.; YERMAKOV, A.N., red.; KUZNETSOV,
V.I., prof., red.; PALEY, P.N., red.; RYABCHIKOV, D.I., red.;
TANANAYEV, I.V., red.; CHERNIKHOF, Yu.A., red.; VOLYNETS, M.P.,
red.izd-va; KASHINA, P.S., tekhn.red.

[Analytical chemistry of thallium] Analiticheskaya khimiya
tallia. Moskva, Izd-vo Akad.nauk SSSR, 1960. 170 p.
(MIRA 14:3)

(Thallium--Analysis)

S/081/61/000/022/013/076
B102/B108

AUTHORS: Tugarinov, A. I., Vaynshteyn, E. Ye.

TITLE: Rare earths in rocks

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 22, 1961, 84, abstract
22G14 (Sb. "Geokhim. tsikly", M., Gosgeoltekhizdat, 1960,
65-77)

TEXT: The fundamental laws of distribution of rare earths (RE) in rocks are considered. Many data on the RE content in rock-forming and accessory minerals of various rock complexes are given. Their principal accumulation in intrusions of the acid series was recorded. Emphasis is laid on the direct connection between RE and alkaline accumulation in rest of magmatic fusion, as well as on their simultaneous segregation as accessory minerals and field spars and recent mica. Mineral formation of postmagmatic alkaline metasomatism is represented as a scheme which verifies the initial separation of doubly ceric RE minerals H and, in later periods, of Y-containing minerals composed of mainly neodymium with strongly reduced La and Ce content. The following RE distribution was

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observed in deposit rocks: In argillaceous rocks, the elements of the Y and Ce groups are concentrated at an equal degree, in phosphate deposits, the Y group is predominant and in carbonate strata the Ce group of the RE. The main factors which determine the conditions of migration, concentration and segregation of RE are considered: crystal-chemical, "kinetic", and geochemical factors. The most probable form in which the RE migrate are compounds of the type $\text{Na}_3[\text{RE}(\text{CO}_3)_3]$, which were experimentally detected under normal conditions as well as at 300°C and 300 atm. In the case of a reduced pH of the alkali carbonate solution, RE of the Ce group primarily are segregated. On the basis of experimental data, a scheme of the RE deposition sequence of RE from different solutions by different precipitants is given. In the authors' opinion, La and Y may be used as sensitive indicators of processes causing deposition and segregation of RE. It is assumed that several intrusions of certain RE groups are enriched with owing to the influence of assimilating deposit strata.
[Abstracter's note: Complete translation.]

Card 2/2

SHEVALEYEVSKIY, I.D.; PAVLENKO, A.S.; VAYNSHTEYN, E. Ye.

Relation between the behavior of zirconium and hafnium and the
petrochemical characteristics of magmatic and alkaline-metasomatic
rocks. Geokhimiia no.3:222-230 '60. (MIRA 14:5)

I. V. I. Vernadskiy Institute of Geochemistry and Analytical
Chemistry, Academy of Sciences U.S.S.R., Moscow.
(Zirconium)
(Hafnium)
(Rocks, Igneous)

VAINSHTEYN, E.Ye.; ALEKSANDROVA, I.T.; TURANSKAYA, N.V.

Rare earth metals in gadolinites from beds of different genetic types. Geokhimiia no.6:498-505 '60. (MIRA 13:10)

1. Vsesoyuznyy institut mineral'nogo syr'ya i Institut geokhimi
i analiticheskoy khimii im. V.I.Varnadskogo AN SSSR, Moskva.
(Gadolinite) (Rare earth metals) (Yttrium)

KUKHARENKO, A.A. ; VAYNSHTEYN, E.Ye.; SHEVALEYEVSKIY, I.D.

The zirconium hafnium ratio in rock-forming pyroxenes and zirconium minerals of the Paleozoic complex of ultrabasic and alkaline rocks in the Kola Peninsula. Geokhimiia no.7:610-617 '60. (MIRA 13:11)

1. Chair of Geochemistry, Leningrad State University and V.I. Vernadsky Institute of Geochemistry and Analytical Chemistry, Academy of Sciences, U.S.S.R., Moscow.
(Kola Peninsula--Rocks, Igneous) (Zirconium)
(Hafnium)

RYABCHIKOV, D.I.; VAYNSHTEYN, E.Ye.; BORISOVA, L.V.; VOLYNETS, M.P.; KOROLEV,
V.V.; KUTSENKO, Yu.I.

Spectrochemical method of determining bismuth, cadmium, antimony, tin
and lead in metallic tungsten, niobium and tantalum. Trudy Kom. anal.
khim. 12:82-93 '60. (MIRA 13:8)
(Tungsten--Analysis) (Niobium--Analysis)
(Tantalum--Analysis)

VAYNSHTEYN, E.Ye.; MIKHAYLOVA, G.V.; AKHMANOVA, M.V.; KUTSENKO, Yu.I.

Method of spectrum determination of iron, calcium, magnesium, chromium,
nickel, silicon and boron in zirconium. Trudy Kom. anal. khim. 12:
142-150 '60. (MIRA 13:8)
(Zirconium--Analysis) (Spectrum analysis)

VAYNSHTEYN, E.Ye.; BELYAYEV, Yu.I.; AKHMANOVA, M.V.

Determination by spectrum analysis of cadmium, antimony, bismuth,
lead and tin in tungsten and molybdenum. Trudy Kom. anal. khim.
12:236-254 '60. (MIRA 13:8)
(Tungsten--Analysis) (Molybdenum--Analysis)
(Spectrum analysis)

VAYNSHTEYN, E.Ye.

Present state of x-ray spectral analysis. Zhur. strukt. khim.
1 no.3:360-369 S-O '60. (MIRA 14:1)

1. Institut neorganicheskoy khimii Sibirskogo otdeleniya AN SSSR.
(X-ray spectroscopy)

ANTIPOVA-KARATAYEVA, I.I.; VAYNSHTEYN, E.Ye.

Study of ion solvation in solution by means of absorption
spectra. Zhur.neorg.khim. 5 no.1:107-111 Ja '60.
(MIRA 13:5)

1. Institut geokhimi i analiticheskoy khimii im. V.I.
Vernadskogo Akademii Nauk SSSR.
(Solvation--Spectra)

3/075/60/015/004/008/030/II
B020/B064

AUTHORS: Korolev, V.V. and Vaynshteyn, E. Ye.
TITLE: The Reasons for the Increased Accuracy of Spectral Analysis 21
When a Pulse Generator Source Is Used
PERIODICAL: Zhurnal analiticheskoy khimii, 1960, Vol. 15, No. 4,
pp. 413 - 418

TEXT: The expediency of pulse generator to increase the accuracy of spectral analysis was shown in Refs. 1,2, and by means of radioisotopes 19 the first data were found on the spatial distribution of the atoms between the electrodes of the generator. The previous paper continues these investigations and describes the most important physical parameters of the pulse arc which may influence the accuracy of determination, and, finally, the authors attempt to find the reasons for which the accuracy is higher than in the case of an ordinary d.c. or a.c. arc. A more precise measurement was made of the generator temperature, the amperage of the pulse current was estimated, and additional data were obtained on the way of the substance into the discharge zone. The temperature of the pulse generator

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The Reasons for the Increased Accuracy of
Spectral Analysis When a Pulse Generator
Source Is Used

S/075/60/015/004/008/030/XX
B020/B064

was determined by Ornshteyn's method and on the basis of the BiI bands. For reasons of comparison, the temperature of an ordinary d.c. arc was determined on the basis of the same bands. ZnO served as a filler in both cases. Bi₂O₃ was mixed with ZnO and introduced into the anode. Fig. 1 gives the results of a series of measurements of the temperature of the pulse and d.c. arcs; the energies of the upper levels of the Bi bands were plotted in cm^{-1} on the abscissas and the corresponding values $(1/0.625)\log(1/P)$ on the ordinate. The plasma temperature was graphically determined from the angular coefficients in these coordinates, and amounted to 8700°K for the pulse arc, and to 6200°K for the d.c. arc. This is in agreement with the data of Ornshteyn and N. N. Sobolev. The oscillogram of the current of the d.c. arc recorded in a synchronous manner by a special oscillographic method, is shown in Fig. 2. The pulse time was determined to be $1.4 \cdot 10^{-5}$ sec, the inductivity of the resonant circuit to be $0.44 \cdot 10^{-6}$ H, and the pulse current maximum to be 540 a. Some results of the experiments carried out to study the spatial distribution of various

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The Reasons for the Increased Accuracy of
Spectral Analysis When a Pulse Generator
Source Is Used

3/075/60/015/004/008/030/XX
B020/B064

elements in the d.c. and a.c. pulse arcs are given (Figs. 3, 4, 5). The distribution of the excited atoms and ions in the pulse arc plasma is characterized by uniformity, as well as by the fact that, in contrast with the d.c. arc, the intensity is independent of the ionization potential of the element. Only elements with low ionization potentials, whose regular distribution can only be attained in the AC arc, form an exception. Fig. 6 graphically shows the change of the blackening degree of the analytical bands of the elements with time in their evaporation from the "crater" of the carbon electrode in the pulse and d.c. arcs, while Fig. 7 shows the scheme of the experiments made to determine the influence of the spark torch on the spatial distribution of the excited zinc atoms and ions. Fig. 8 shows the change of intensity of the zinc bands ZnI 3075 and ZnII 2557.9 along the gap between the electrodes of the pulse generator in projecting radiation upon the slit of the spectrograph in the presence and absence of a spark torch. There are 8 figures and 10 references: 9 Soviet and 1 Dutch. ✓

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The Reasons for the Increased Accuracy of
Spectral Analysis When a Pulse Generator
Source Is Used

S/075/60/015/004/005/030/XX
B020/B064

ASSOCIATION: Institut geokhimii i analiticheskoy khimii im.
V. I. Vernadskogo AN SSSR, Moskva (Institute of Geochemistry
and Analytical Chemistry imeni V. I. Vernadskiy of the
AS USSR, Moscow)

SUBMITTED: July 13, 1959

Card 4/4

85637

S/075/60/015/005/009/026/XI
B002/B056

243400
AUTHORS:

Vaynshteyn, E. Ye., Belyayev, Yu. I., and Parafonov, M. M.

TITLE:

Use of a "Sounding" Arc for the Control of the Process of Feeding the Substance Into a d.c. Arc Plasma 21

PERIODICAL:

Zhurnal analiticheskoy khimii, 1960, Vol. 15, No. 5, pp. 550 - 555

TEXT: The reproducibility of spectroanalytical determinations is also impaired in the case of electrical conditions which are carefully kept constant by the fact that fluctuations occur in the evaporation of the sample. The authors endeavored to control these fluctuations acoustically: Parallel to the d.c. arc an oscillatory circuit with $C = 8 - 18 \mu F$ and $L = 0.1 - 0.25$ mH was connected in series herewith; the frequency could be controlled between 50 and 20,000 cps. In order to enlarge the amplitude, a capacitor with $5 - 16 \mu F$ was further connected parallel to the arc. (Fig.1). The acoustic vibrations were recorded by means of a tape recorder for purposes of control. A cathode ray oscillograph was used to measure the intensity. By means of this method, the evaporation

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Use of a "Sounding" Arc for the Control of S/G75/60/015/005/009/026/XI
the Process of Feeding the Substance Into B002/B056
a d.c. Arc Plasma

of Fe, Ni, Si, Cr, Al, and Na from mixed oxide of uranium was studied in the presence of Ga_2O_3 and NaCl (Figs. 2 and 3). Systematic experiments were carried out with KCl, NaCl, Al-metal, Al_2O_3 , $CaCl_2$, $FeCl_3$, SiO_2 , $ZnCl_2$, Na, Th, and Be showed that the duration of "sounding" and of the pauses depends, among other things, on the following factors: Concentration on the electrode, volatility and ionization potential of the elements, temperature (Figs. 4-7, Table). Moreover, the influence exerted by gamma rays (Na^{24}) upon the operation of the "sounding" arc was determined (Fig.8). The authors thank V. A. Kosterin for assisting in the experiments. A paper by A. K. Rusanov is mentioned. There are 8 figures, 1 table, and 4 Soviet references.

ASSOCIATION: Institut geokhimii i analiticheskoy khimii im. V. I. Vernadskogo AN SSSR, Moskva (Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy of the Academy of Sciences USSR, Moscow)

SUBMITTED: November 23, 1959

Card 2/2

87135

S/075/60/015/006/007/018
B020/B066

5.5800

1043, 1136, 1273

AUTHORS: Korolev, V. V. and Vaynshteyn, E. Ye.
TITLE: An Attempt of Using a Plasma Generator for the Spectroscopic Analysis of Silicates
PERIODICAL: Zhurnal analiticheskoy khimii, 1960, Vol. 15, No. 6, pp. 686-691

TEXT: Besides other scientists, the authors of Ref. 2 pointed out that plasma generators are suitable as new efficient sources for the excitation of spectra. They showed that the accuracy of spectroscopic analysis of a number of elements is thus increased. In the present paper, the first results of spectroscopic analysis of silicates obtained by means of this new source are reported. The construction of the plasma generator for the analysis of solutions is described in detail (Fig. 1). This generator was tested at different amperages and pressures of the cooling gas. The following conditions were most favorable: amperage 15 - 22 a, and inlet pressure into the sprayer 0.8 - 1.2 atmospheres overpressure. Fractional distillation of the elements can be avoided by introducing the analyzed

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An Attempt of Using a Plasma Generator for the S/075/60/015/006/007/018
Spectroscopic Analysis of Silicates B020/B066

solution into the plasma in the form of an aerosol, and a higher homogeneity of introduction of the elements into the flow during analysis can be attained (Fig. 2). In Fig. 2, the curves for the tested source obtained on introduction of Si, Ti, Al, and Fe are compared with the curves obtained on evaporation of the same elements from powdery samples in a d.c. arc and pulse arc. By adding a small quantity of the standard to the analyzed solutions, the homogeneous supply of substance into the plasma flow as well as the total intensity of the spectrum can be increased. Fig. 3 shows a group of curves which illustrate the distribution of band blackening of excited atoms and ions of elements along the flow in the plasma generator. The atoms or ions of elements with low or medium ionization potentials have curves characteristic of the change of blackening along the plasma flow with a distinct maximum. The quantitative determination of Si, Ti, Al, Fe, Ca, Mg, Mn, Na, and K is made from one sample at a content of the elements from 0.5 to 80%. First, silicic acid is separated and determined gravimetrically, then the remaining elements. The dissolution of the sample and the determination of SiO_2 is described in detail.

The filtrate is spectroscopically analyzed. The optimum gas pressure at the inlet of the sprayer is 1 atmosphere overpressure, the optimum

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An Attempt of Using a Plasma Generator for the S/075/60/015/006/007/018
Spectroscopic Analysis of Silicates B020/B066

amperage 20 a. Form and dimensions of electrodes are shown in Fig. 4. The electrode spacing was 4 mm. The analytical bands of the elements determined, and the corresponding bands of the reference element are given in Table 1. Also the optimum concentration ranges, when using the given pair of bands, are shown there. Molybdenum was used as reference element in the determination of Ti, Al, Fe, Mg, Ca, and Mn, and lithium in the determination of alkali metals. The resultant spectrograms were determined on an MF-2 (MF-2) microphotometer. When analyzing the first group of elements, the calibration curves were plotted in the coordinates $\Delta S - \log C$ (Fig. 5); in the case of Na and K, the method of the spectrum band width (Refs. 7, 8) was used (Fig. 6). The calibration curves are in both cases straight lines in a wide range. The mean square error in the analysis of elements fluctuates between 2.5 and 3.5% (Table 2). The results obtained are compared with those of the chemical and spectroscopic analyses (Table 3). The authors express their gratitude to N. I. Koroleva for assistance in the experiments. V. V. Nalimov is mentioned (Ref. 9). There are 6 figures, 3 tables, and 9 references: 7 Soviet and 2 US.

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87135

An Attempt of Using a Plasma Generator for the S/075/60/015/006/007/013
Spectroscopic Analysis of Silicates B020/B066

ASSOCIATION: Institut geokhimii i analiticheskoy khimii im. V. I.
Vernadskogo AN SSSR
(Institute of Geochemistry and Analytical Chemistry imeni
V. I. Vernadskiy of the AS USSR)

SUBMITTED: March 3, 1960

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83553

S/020/60/134/001/004/021
B019/B060

24.7600 also 2308
AUTHORS:

Vaynshteyn, E. Ye., Zhurakovskiy, Ye. A., Neshpor, V. S.,
Samsonov, G. V.

TITLE:

The Fine Structure of X-Ray K-Absorption Spectra and the
Hall Effect in Vanadium Silicides

PERIODICAL:

Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 1,
pp. 68-70

TEXT: The authors studied the fine structure of X-ray K-absorption spectra of vanadium and its silicides V_3Si , V_5Si_3 , and VSi_2 . The crystal structure of these compounds and the production of silicides are discussed in the introduction. The free silicon content in silicides did not exceed 0.6%. The apparatus has already been described. Fig. 1 shows the fine structures of the K-absorption edges of vanadium, its above-mentioned silicides, and V_2O_5 . The Hall effect of these three silicides and vanadium was likewise determined. In accordance with the n-type conductivity of the silicides they possess a negative Hall

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The Fine Structure of X-Ray K-Absorption
Spectra and the Hall Effect in Vanadium
Silicides

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B019/B060

constant, while metallic vanadium, in accordance with its p-type conductivity, has a positive Hall constant. The effective carrier concentration n^* and its Hall mobility were determined with the aid of the Hall constants obtained. Results are compiled in Table 1. As may be seen from Fig. 1, the K-absorption edge undergoes a considerable and regular alteration in the case of increasing silicon content. Only that point of the edge remains unchanged, which characterizes the position of the original absorption range in the energy spectrum. The absorption maximum shifts toward higher energies on a transition of metallic vanadium to the silicides with rising Si content, and on a further transition to V_2O_5 . Owing to the invariable position of the original absorption range, the shift of the maximum leads to a widening of the edge and, hence, causes the "mean point" of the K-edge to shift toward shorter wavelengths. With increasing Si content the width of the K-edge approaches that of V_2O_5 , which is a compound with a large part of ionic bond. This indicates a polarization of the metal atoms in the silicon-rich silicides and a heteropolar component in metal-silicon compounds. ✓

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The Fine Structure of X-Ray K-Absorption
Spectra and the Hall Effect in Vanadium
Silicides

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This is in good agreement with results obtained from a quantum-mechanical calculation of the energy spectrum of electrons for molybdenum disilicide (Ref. 9). The authors finally discuss the behavior of the ultra-longwave absorption maximum A (Fig. 1), which is connected with the transition of K-electrons in the region of hybridized 3d-states of transition metal atoms. The authors believe that the shift of absorption maximum A is related to the d-states perturbed by the surrounding silicon atoms. There are 1 figure, 1 table, and 10 references: 6 Soviet, 2 German, 1 US, and 1 British.

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov Akademii nauk SSSR (Institute of Powder Metallurgy and Special Alloys of the Academy of Sciences USSR). Institut geokhimii i analiticheskoy khimii im. V. I. Vernadskogo Akademii nauk SSSR (Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy of the Academy of Sciences USSR)

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83553

The Fine Structure of X-Ray K-Absorption
Spectra and the Hall Effect in Vanadium
Silicides

S/020/60/134/001/004/021
B019/B060

PRESENTED: April 29, 1960, by A. P. Vinogradov, Academician

SUBMITTED: April 29, 1960

4

Card 4/4

VAYNSHTEYN, E.Ye.; BELYAYEV, Yu.I.

Use of radioactive isotopes in the study of the distribution of
atoms in the plasma of a d. c. arc in various atmospheres. Dokl.
AN SSSR 134 no.2:322-325 S '60. (MIRA 13:9)

1. Institut geokhimii i analiticheskoy khimii im. V.I.Vernadskogo
Akademii nauk SSSR. Predstavleno akad. A.P.Vinogradovym.
(Plasma (Ionized gases)) (Electric arc) (Isotopes)

VAYNSHTEIN, E.Ye.; ZHURAKOVSKIY, Ye.A.; STARYY, I.B.

X-ray spectroscopic study of titanium beryllides. Dokl. AN SSSR
135 no.3:642-644 N '60. (MIPA 13:12)

1. Institut geokhimii i analiticheskoy khimii im. V.I. Vernadskogo
Akademii nauk SSSR i Odesskiy pedagogicheskiy institut im. K.D.
Ushinskogo. Predstavleno akademikom A.P. Vinogradovym.
(Titanium compounds—Spectra)
(Beryllium compounds—Spectra)

VAYNSHTEYN, Emmanuil Y.,

"Emission spectrometry"

To be submitted for the 9th International Spectroscopy Colloquium, Lyon, France,
5-10 June 1961.

Institute of Geochemistry and Analytical Chemistry imeni V.I. Vernadskiy.

VAYNSHTEYN, E. Ye.

"Rare earths in rocks"

Paper submitted at the International Geological Congress XXI Session -
1960 (Reports of Soviet Geologists) Problem No. 1, 15-24 Aug. 61

ALIMARIN, I.P.; BILIMOVICH, G.N.; BUSEV, A.I.; VAYNSHTEYN, E.Ye.; VOLYNETS, M.P.; GORYUSHINA, V.G.; DYMOV, A.M.; YELINSON, S.V.; ZVIAGINTSEV, O.Ye.; KOLOSOVA, G.M.; KORCHEMNAYA, Ye.K.; LEBEDEV, V.I.; MALOFEYEVA, G.A.; MELENT'YEV, B.N.; NAZARENKO, V.A.; NAZARENKO, I.I.; PETROVA, T.V.; POLUEKTOV, N.S.; PONOMAREV, A.I.; RYABUKHIN, V.A.; STROGANOVA, N.S.; CHERNIKHOV, Yu.A.; VINOGRADOV, A.P., akademik, otv. red.; RYABCHIKOV, D.I., doktor khim. nauk, prof., otv. red.; GUS'KOVA, O., tekhn. red.

[Methods for the determination and analysis of rare elements] Metody opredeleniia i analiza redkikh elementov. Moskva, 1961. 667 p.

(MIRA 14:7)

1. Akademiya nauk SSSR. Institut geokhimii i analiticheskoy khimii.
(Metals, Rare and minor)

VAYNSHTEYN, E.Ye.; ANTIPOVA-KARATAYEVA, I.I.

Spectrophotometric study of the structure of solvated ions in solutions and the degree of their stability under X-irradiation.
Izv. Sib. otd. AN SSSR no. 3:38-45 '61. (MIRA 14:5)

1. Institut geokhimii i analiticheskoy khimii im. V.I. Vernadskogo
AN SSSR, Moskva, i Institut neorganicheskoy khimii Sibirskogo
otdeleniya AN SSSR, Novosibirsk.
(Solvation) (X rays)

S/007/61/000/004/001/004
B107/B207

AUTHORS: Ronov, A. B., Vaynshteyn, E. Ye., Tuzova, A. M.

TITLE: Geochemistry of hafnium, zirconium and some other elements -
hydrolyzates in clays

PERIODICAL: Geokhimiya, no. 4, 1961, 306-315

TEXT: Sixteen mixed samples, consisting of 277 samples altogether, were examined. The samples originated from Fammenian and Yasnaya Polyana strata. Partly complete and partly partial silicate analyses were made from the samples (Table 1). The zirconium and hafnium contents were determined by X-ray analysis. The sand and clay fraction of two samples were mineralogically studied. Summarizingly, the following is stated: the mean hafnium content in clays is $6 \cdot 10^{-4}\%$ and, therefore, higher than in theoretical calculations ($4 \cdot 10^{-4}\%$). The Zr- and Hf content depends on climate and tectonics; it is considerably higher in clays of humid than in clays of arid origin. The Zr/Hf ratio changes little; only at considerable changes of the physico-chemical conditions, e.g., at the transition from the alkaline medium of arid basins into the acid medium of humid basins, changes

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occur which correspond to those of the Al_2O_3/SiO_2 and Al_2O_3/TiO_2 ratios. ✓
Apparently, the Zr/Hf ratio is particularly affected by humic acids and other organic acids with which Zr forms complexes more readily. Thus, the Zr/Hf ratio decreases. A study of the fractions shows a concentration of Zr and Hf in the sand fraction, i.e., in the accessory zircons and titanium minerals. The amounts of these minerals contained in the clays and, consequently, their Zr and Hf content increase toward the areas of denudation. This indicates that the majority of Zr and Hf is of terrigenous origin. The following persons are thanked for collaboration: Li Ang-mo, Laboratory Assistant, for his assistance in the X-ray analysis, K. V. Gorshkova, N. V. Yermeyeva, A. I. Yermishkina, G. A. Zolotova, G. A. Korzina, and I. V. Markova, analysts, for silicate analyses, I. I. Solodkova and R. F. Ryabova, mineralogists, for analyzing the sand fractions, I. D. Ekhus, Candidate of Geological and Mineralogical Sciences for determining minerals in clay fractions, V. V. Shcherbina for discussion. A. P. Vinogradov and I. D. Shevaleyevskiy are mentioned. There are 6 figures, 2 tables, and 8 references: 7 Soviet-bloc. The reference to the English-language publication reads as follows: H. Degenhardt. Geochim.

Card 2/5

Geochemistry of...

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B107/B207

et Cosmochim. Acta, 11, no. 4, 1957.

ASSOCIATION: Institut geokhimii i analiticheskoy khimii im.
V. I. Vernadskogo AN SSSR, Moskva (Institute of Geochemistry
and Analytical Chemistry imeni V. I. Vernadskiy of the
Academy of Sciences USSR)

SUBMITTED: September 27, 1960

Legend to Table 1: Zirconium and hafnium contents in the clays of the
Russkaya Platform and their chemical compositions (wt%); a) region,
drilling; b) age; c) number of samples in the mixed sample; d) conditions
of clay formation due to facies or climate; e) C_{org} ; f) loss on ignition,
i.e., difference between the loss on ignition and the sum of the determined
volatile substances: CO_2 , C_{org} , H_2O^+ and H_2O^- . In the cases where water
was not determined, the loss on ignition indicates the difference between
the loss on ignition and the sum $CO_2 + C_{org}$; g) sum. (1) Valday, drilling:

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continental, arid. (2) Lyuboni, 7283; continental, arid. (3) Kotel'nich. opornaya skvazhina (test boring); saline lagoon, arid. (4) Redkino, test boring; salt lagoon, arid. (5) Povarovka, test boring; saline lagoon, arid. (6) Soligalich, test boring; saline lagoon, arid. (7) Shar'ya, test boring; saline lagoon, arid. (8) Loshaki boring 98488; continental; colored, humid. (9) Loshaki, boring 98488, fraction 0.1 - 0.01 mm; continental colored; humid. (10) Loshaki, drilling 98488, fraction below 0.001 mm; continental colored; humid. (11) Abakumovo, boring 110212; continental carboniferous; humid. (12) Abakumovo, boring 110212, fraction 0.1 - 0.01 mm; continental carboniferous; humid. (13) Abakumovo, boring 110212, fraction below 0.001 mm; continental carboniferous; humid. (14) Bogoroditskoye, boring 93046; continental colored; humid. (15) Pronsk, boring 110203; continental carboniferous; humid. (16) Nikandrovo, boring 7285; continental colored; humid. (17) Lyubytino, boring 6157; continental colored; humid. (18) River Shuya, boring 6105, continental colored; humid. (19) Lyuboni, boring 7283; continental carboniferous; humid. (20) Staritsa, test boring; bordering land to marine; humid. (21) Mean value for arid clays. (22) Mean value for humid clays. (23) Mean value

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B107/B207

for clays. C_1^{ACH} - Yasnaya Polyana

(Note: Due to the size of the Table, we were unable to fit it to a master.)

Card 5/5

VAYNSHTEYN, E. Ye.; LEBEDEV, V.I.

Recent determinations of Li, Na, K, Rb, Cs, Ca, and Sr in the standards W-1 and G-1 by flame photometry. Geokhimiia no.4:362-363 '61. (MIRA 14:5)

1. Institut geokhimii i analiticheskoy khimii imeni V. I. Vernadskogo AN SSSR, Moskva.
(Metals—Spectra)

9,6150

25280

S/200/61/000/007/004/006
D238/D302

AUTHORS: Vaynshteyn, E.Ye., Staryy, I.B., and Tsukerman, V.G.

TITLE: The use of CdS single crystals for low intensity X-ray spectral analysis

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Sibirskoye otdeleniye, no. 7, 1961, 48 - 54

TEXT: The aim was to study the use of photo-cell resistance of CdS single crystals in low intensity X-ray spectrum analysis. Previous work had revealed the sensitivity, durability, stability and convenience of these crystals but it had nearly all been carried out with high intensity radiation. The experiments reported here were carried out with standard photo-cell resistances, type FSKM2. Fig. 1 shows experimental scheme. A diagnostic X-ray tube, type 2-BDM-75, was placed 15 cm from the photo-cell resistance, and a roentgen quanta counter (nx 64 imp/min) 60 cm from the tube, thereby allowing direct and indirect measurement of intensity. The tube

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was fed from a high-voltage rectifier with a capacitive filter at a constant voltage of 30 kw. The current passing through the tube never exceeded 150 microamps, and copper and aluminum absorbers of various thicknesses were placed in the path of the rays. The voltage on the photo-cell was provided by a potentiometer and measured by a voltmeter. The current (I_F) passing through the photo-cell resistance was measured by a special vacuum tube apparatus, built on a bridge circuit which could measure to orders of 10^{-10} amps. All parts of the apparatus were carefully screened against interference. The photo-cell resistance voltage was determined experimentally for each data unit to guarantee the maximal signal background ratio (I_F/I_T) which gives the optimal feeding regime for each photo-cell resistance ($20 < U_F < 40$ v). This regime is distinct from that used to measure high intensity radiation or when these instruments are used in the visible portion of the spectrum and is independent of the radiation recorded by the photo-cell resistance. Results in these experiments agreed with previous reports and confirmed the li-

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near relation between photo current strength and the radiation intensity on the resistances for all specimen of CdS crystals studied. The volt-ampere curve of the photo-cell resistance did not obey Ohm's law the discrepancy growing with increase in voltage and photometric intensity. Important complicating factors in using photo-cell resistances for recording weak radiation are their sluggishness and the effect of the specimen's previous history on the photo-cell current, which factors become more important as intensity diminishes. It has been reported that brightening of CdS photo-cell resistance was useful and this was studied here. The photo current strength, evoked by the effect of the illumination, on the resistance was excluded. Illumination influences not only the sensitivity to X-rays, but also the time taken to reach a constant photo-cell current value. The exact nature of the influence depends on the spectral composition of the illumination, visible light of low intensity giving better results than ultra-violet light both as regards overcoming sluggishness and for decreasing the time for photo-cell current fall-off when radiation stops. For more accurate

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results it is better to use a special measuring cell in which the photo-cell resistance is mounted with some fluorescent material both being irradiated simultaneously. Work with such a cell is to be reported. Conclusions: 1) CdS photo-cell resistance can be used to register low intensity radiation. 2) The sluggishness of the photo-cell resistance rises as the radiation intensity falls and may be counteracted by preliminary irradiation of the resistance. 3) The effect of brightening on sensitivity and inertia depends on the spectral composition of the illumination. As a supplementary means of decreasing inertia low intensity visible light is most effective. There are 10 figures, 1 table and 9 references: 7 Soviet-bloc and 2 non-Soviet-bloc. The references to English-language publications read as follows: J. Fassbender, Annd. Phys. 5, 33, 1949; H. Simon, Annd. Phys. 12, 45, 1958.

ASSOCIATION: Institut geokhimii i analiticheskoy khimii im. Vernadskogo AN SSSR; Institut neorganicheskoy khimii Sibirskogo otdeleniya AN SSSR; Odesskiy pedagogicheskiy institut im. K.D. Ushinskogo (Institute of Geochemistry

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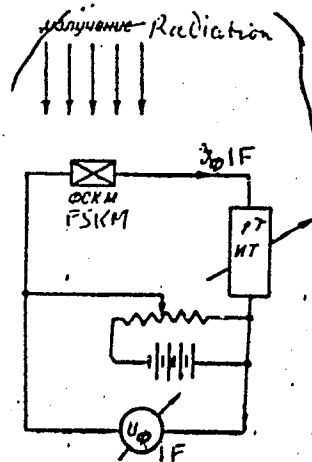
and Analytical Chemistry im. Vernadskiy, AS USSR; Institute of Inorganic Chemistry of the Siberian Branch, AS USSR; Odessa Pedagogical Institute im. K.D. Ushinskiy)

SUBMITTED: December 29, 1960

Fig. 1. Scheme of apparatus.

Legend: FSKM - photocell resistance; IT - to measure current I_F - voltmeter.

Рис. 1. Схема экспериментальной установки.
ФСКМ - фотосопротивление; ИТ - измеритель тока U_ϕ - вольтметр.



Card 5/5

VAYNSHTEYN, E.Ye.; PAVLENKO, A.S.; TURANSKAYA, N.V.; YULOVA, T.G.

Effect of the distribution of rare earth elements in rocks on petrochemical factors and its significance for the solution of petrogenetic problems. Geokhimiia no.12:1077-1086 '61. (MIRA 15:3)

1. Vernadskiy Institute of Geochemistry and Analytical Chemistry, Academy of Sciences, U.S.S.R., Moscow.
(Rare earth metals) (Petrology)

ANTIPOVA-KARATAYEVA, I.I.; VAYNSHTEYN, E. Ye.

Reply to I.S. Pominov's letter "Comments on the paper by I.I. Antipova-Karataeva and E. E. Vainshtein." Zhur. neorg. khim. 6 no.3:759 Mr '61. (MIRA 14:3)

1. Institut geokhimii i analiticheskoy khimii imeni V. I. Vernadskogo Akademii nauk SSSR.
(Solvation)
(Pominov, I.S.)

ANTIPOVA-KARATAYEVA, I.I.; VAYNSHTEYN, E.Ye.

Solvation of cobalt ions in aqueous solutions as studied by
optical absorption spectra. Zhur.neorg.khim. 6 no.4:816-824
Ap '61. (MIRA 14:4)

1. Institut geokhimii i analiticheskoy khimii imeni V.I.Vernadskogo
AN SSSR. (Cobalt--Spectra)

ANTIPOVA-KARATAYEVA, I.I.; VAYNSHTEYN, E.Ye.

Study of the solvation of cobalt ions in nonaqueous solutions by means of optical absorption spectra. Zhur.neorg.khim. 6 no.5: 1115-1124 My '61. (MIRA 14:4)

(Cobalt compounds--Spectra)

ANTIPOVA-KARATAYEVA, I.I.; VAYNSHTEYN, E.Ye.; KUTSENKO, Yu.I.

Study of the solvation of a trivalent titanium ion in aqueous solutions. Zhur.neorg.khim. 6 no.10:2329-2333 0 '61.

(MIRA 14:9)

1. Institut geokhimii i analiticheskoy khimii imeni V.I.Vernadskogo Akademii nauk SSSR.

(Titanium compounds)

15 2240

30450
S/126/61/012/003/004/021
E021/E180

AUTHORS: Vaynshteyn, E.Ye., Verkhoglyadova, T.S.,
Zhurakovskiy, Ye.A., and Samsonov, G.V.

TITLE: The fine structure of X-ray absorption K-spectra of
the metal in the homogeneous region of titanium
nitride

PERIODICAL: Fizika metallov i metallovedeniye, v. 12, no. 3, 1961,
360-364

TEXT: X-ray spectrographic studies of titanium carbide were
published earlier. The present work investigated the effect of
concentration changes of the titanium nitrogen system in the
region where only the phase TiN exists (30-50 at.% N). Samples
containing 11.7, 12.8, 14.7, 15.4, 17.5, 18.1, 18.8, 20.6, 21.2
and 22.4 wt.% nitrogen were prepared by the method given by Samsonov
and his team (Ref. 5: Sb. Metallokeramicheskiye materialy i
metody ikh issledovaniya, AN USSR, Kiev, 1959, p. 53 (Symposium:
Cermets and methods of studying them, AS Ukr.SSR, Kiev, 1959, p. 53)).
X-ray phase analysis showed that in all the specimens only one
phase existed with a NaCl-type lattice having a parameter
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The fine structure of X-ray

S/126/61/012/003/004/021
E021/E180

increasing from 4.212 to 4.235 kX with increasing nitrogen content. X-ray spectrographic studies were carried out on apparatus described earlier by I.B. Staryy, (Ref.7: Izv. AN SSSR, ser. fiz., 1958, Vol.20, 798). The crystalline structure of titanium nitride is always octahedral. Decreasing nitrogen content in the nitride phase, although maintaining the octahedral coordination, should lead to a reduction in the role of the p-functions, decreasing their contribution to the d-band and therefore decreasing the coefficient of absorption in the corresponding spectral region; this was actually observed for all compositions, except those with 21.2 and 22.4 wt.% nitrogen, which very nearly correspond to the stoichiometric composition of TiN. Another explanation of the change in the fine structure of absorption spectra is that in the nitride phase there is a considerable ionic component in the bonds which decreases with transition from the samples deficient in nitrogen to the compound with stoichiometric composition. This is confirmed by results of measurements of the electrical properties and microhardness of the samples. S.N. L'vov and V.F. Nemchenko are mentioned in the article for their contributions in this field.

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The fine structure of X-ray

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E021/E180

There are 2 figures and 16 references: 13 Soviet-bloc and 3 non-Soviet-bloc. The English language reference reads as follows:
Ref.12: G. Kimball, J. Chem. Phys., 1940, Vol.8, 188.

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov
AN USSR (Institute of Powder Metallurgy and Special
Alloys, AS Ukr.SSR)
Institut neorganicheskoy khimii Sibirskogo
otdeleniya AN SSSR (Institute of Inorganic
Chemistry, Siberian Department AS USSR)

SUBMITTED: January 2, 1961

X

Card 3/3

LEBEDEV, V.I.; VAYNSHTEYN, E. Ye.

Increasing the sensitivity of the determination of elements in a flame. Zhur.anal.khim. 16no.2:124-128 Mr-Apr '61.

(MIRA 14:5)

1. Vernadskiy Institute of Geochemistry and Analytical Chemistry, Academy of Sciences, U.S.S.R., Moscow.

(Flame photometry)

28282
S/075/61/016/005/001/010
B101/B110

5.5310

AUTHORS: Vaynshteyn, E. Ye., Korolev, V. V., and Savinova, Ye. N.

TITLE: Conditions for the spectrum excitation of elements in a plasma generator, and its use for spectrum analysis

PERIODICAL: Zhurnal analiticheskoy khimii, v. 16, no. 5, 1961, 532 - 537

TEXT: The inhomogeneous distribution of alloying additions and of impurities in titanium alloys rules out their analysis in spark or arc spectra. The authors therefore suggest the plasma generator as a new excitation source for the spectrum analysis of solutions. The present paper reports on systematic studies on the influence of different conditions upon the blackening of lines of various elements, as well as on the method of analyzing titanium alloys. Results: (1) The excitation energy of spectrum lines affects the shape and position of blackening maxima. If the energy is reduced, the maxima become broader and their distance from the origin of the jet increases. (2) Anions do not affect the blackening degree. (3) The difference, ΔS , between the blackening degrees of the two iron lines Fe II 2598.4 and Fe I 2719.02 decreases linearly along

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Conditions for the spectrum excitation ...

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S/075/61/016/005/001/010
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the jet. Addition of 50% alcohol does not alter this ratio but decreases the temperature, broadens the maxima, and shifts them toward the origin of the jet. The analytical method devised can be used to determine Al, Cr, Mo, Fe, Si, V, Mn, and Sn in Ti alloys. In the present paper, however, only the determination of Al, Cr, Mo, V, and Mn is described. The standard solutions were obtained by mixing the calculated quantities of solutions of the chlorides of the elements to be determined with the TiCl_4 solution. Cobalt salt (10 mg/ml of Co) was used as the reference element. 5 ml of its solution was added to 50 ml of the test solution. 0.5 g of the alloy to be analyzed was dissolved in 20 ml pure HCl, TiCl_3 was oxidized by dropwise addition of concentrated HNO_3 , and 5 ml of Co salt solution was added. The spectrum analysis was carried out with a plasma generator described by V. V. Korolev, E. Ye. Vaynshteyn in Zh. analit. khimii, 15, 686 (1960), whose nozzle had a diameter of 6.5 mm. About 6.5 liter/min of cooling gas (argon) was spent, the gas pressure at the input of the atomizer was 2.5 at, the consumption of solution was 6 - 8 milliliter/min, and the electrode spacing was 3 mm. The plasma generator was operated with 20 a and 270-v d-c. A distance of 22 mm from the origin

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S/075/61/016/005/001/010

Conditions for the spectrum excitation ... B101/B110

of the jet was found to be an optimum for the spectroscopic record. The lines of all elements could be taken with the same slit adjustment of an ИСП-22 (ISP-22) spectrograph. The spectra were taken on type-II spectroscopic plates with a sensitivity of 16 ГОСТ (GOST) units, and developed in a Д-19 (D-19) developer. The preexposure was 20 sec and that of the principal exposure 75 sec. The spectrograms of standards and alloys were photometrically determined with an МФ-2 (MF-2) microphotometer. The calibration curves $\Delta S = f(\log c)$ (c = concentration) were linear. The mean arithmetic error was 3-4 %. K. A. Sukhenko is thanked for providing the alloys. There are 8 figures, 2 tables, and 9 references: 3 Soviet and 6 non-Soviet. The most recent reference to the English-language publication reads as follows: Margoshes, M., Scribner, B. F., Spectrochimica Acta, 2, 138 (1959).

ASSOCIATION: Institut geokhimii i analiticheskoy khimii im. V. I. Vernadskogo AN SSSR, Moskva (Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, AS USSR, Moscow)

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VAYNSHTEYN, E.Ye.; LEBEDEV, V.I.

Effect of some organic substances on calcium radiation
in a flame in the presence of aluminum. Zhur.anal.khim. 16
no.6:670-673 N-D '61. (MIRA 14:12)

1. Vernadsky Institute of Geochemistry and Analytical Chemistry,
Academy of Sciences U.S.S.R., Moscow
(Calcium--Spectra)
(Aluminum compounds)

L 19364-63 EWP(j)/EPF(c)/EWP(q)/EWT(m)/BDS AFFTC/ASD/APGC Pc-4/
Pr-4 RM/WH/WH/MAY

ACCESSION NR: AR3006967

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SOURCE: RZh. Fizika, Abs. 8D106

AUTHORS: Vaynshteyn, E. Ye.; Kopelev, Yu. F.; Kotlyar, B. I.

TITLE: Investigation of structure of ferrocene and ferricyanum by means of X-ray K-absorption spectra

CITED SOURCE: Nauchn. zap. kafedr. matem., fiz. i yestestvozn. Odessk. gos. ped. in-t, v. 25, no. 2, 1961, 59-64

TOPIC TAGS: ferrocene, ferricyanum, spectral structure, K-absorption, X-ray

TRANSLATION: An x-ray spectrograph with quartz crystal (1340 planes) was used to investigate the K absorption edge of iron in $\text{Fe}(\text{C}_5\text{H}_5)_2$ and $\text{Fe}(\text{C}_5\text{H}_5)_2\text{Cl}$. The calculation of the absorption edge was carried out under the assumption that the system is hydrogen-like. The in-

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